Chemical and Biological Defense
CBIAC Information Analysis Center
Newsletter
2006
A U.S. Department of Defense Information Analysis Center sponsored by the Defense Technical Information Center
Volume 7 Number 4

CBIAC Celebrates 20 Years of Service to the CBRN Defense and Homeland Security Communities

From its inception in 1986 to the present, the Chemical and Biological Defense Information Analysis Center (CBIAC) has become the premier resource for Chemical, Biological, Radiological, and Nuclear (CBRN) Defense and Homeland Security science and technology. Throughout the twenty years the CBIAC has been in operation, events have increased the focus, attention and need for authoritative information on CBRN Defense and Homeland Security. As reflected in the establishment of the Department of Homeland Security, CBRN Defense has moved from a purely military requirement to one that is front and center in other sectors as well. Organizations have been established and departments expanded to include CBRN counterterrorism, functional planning and a wide range of emergency response programs.

Starting as a small operation on the Edgewood Area of Aberdeen Proving Ground, Maryland, the CBIAC has expanded its staff, accessibility, products and services to meet the increased and increasingly complex requirements of the populations it serves. The original staff consisted of four people ready to bring a concept and vision into reality. At its beginning, CBIAC business was conducted by phone, mail or in person. Today, the CBIAC has a staff of over 21 people, with representatives in six satellite locations. Riding the wave of transition to electronic communications, along with established business approaches, the CBIAC's resources now include a Web site with interactive forms for all CBIAC products and services as well as informational resources available online free of charge.

Mission

In the beginning, the CBIAC, along with DTIC and the other IACs, was aligned under DDR&E. This emphasized support to the DoD Research, Development, Test and Evaluation (RDT&E) community. In 1999, DTIC, and thus the CBIAC and the other DoD IACs, was re-aligned under the Defense Information Systems Agency (DISA), resulting in an increased emphasis on support to the Regional Combatant Commanders and the warfighters. Although this support had always been key to CBIAC, it gained a higher level of visibility. In 2001, the terrorist events in the U.S. brought the CBIAC additional visibility as an authoritative resource for Domestic Preparedness and Homeland Security. In 2004, DTIC, CBIAC, and the other DoD IACs were re-aligned under DDR&E, re-emphasizing our alignment with the DoD RDT&E community.

As one of 20 U.S. DoD-sanctioned Information Analysis Centers (IACs) in the United States and one of nine IACs under DTIC, the CBIAC provides CBRN Defense and Homeland Security science and technology information to the DoD; the military services;

Continued pg. 8

The **Chemical and Biological Defense Information Analysis Center (CBIAC)** is a Department of Defense (DoD)-sponsored Information Analysis Center (IAC) operated by Battelle Memorial Institute and supported by Horne Engineering Services, Inc., Innovative Emergency Management, Inc., MTS Technologies, Inc., QuickSilver Analytics, Inc., and SciTech, Inc., and administered by the Defense Technical Information Center (DTIC) under the DoD IAC Program Office (Contract No. SP0700-00-D-3180).

The CBIAC Contracting Officer's Technical Representative (COTR) may be contacted at the following address:

CDR USA RDECOM
Edgewood Chemical Biological Center
ATTN: AMSRD-ECB-RT (CBIAC COTR)
5183 Blackhawk Road
Aberdeen Proving Ground, MD 21010-5424

U.S. Government agencies and private industry under contract to the U.S. Government can contact the CBIAC for information products and services. CBIAC services also extend to all state and local governments and the first responder community, to include local emergency planners, firefighters, medics and law enforcement personnel.

Approved for Public Release; Unlimited Distribution

Table of Contents

2006 Volume 7 Number 4

The ***CBIAC Newsletter***, a quarterly publication of the CBIAC, is a public release, unlimited distribution forum for chemical and biological defense information. It is distributed in hardcopy format and posted in Portable Document Format (PDF) on the CBIAC Homepage.

The CBIAC welcomes unsolicited articles on topics that fall within its mission scope. All articles submitted for publication consideration must be cleared for public release prior to submission. The CBIAC reserves the right to reject or edit submissions. For each issue, articles must be received by the following dates: First Quarter (Number 1) – October 15th; Second Quarter (Number 2)– January 15th; Third Quarter (Number 3) – April 15th; Fourth Quarter (Number 4) – July 15th.

All paid advertisements and articles are subject to the review and approval of the CBIAC COTR prior to publication. The appearance of an advertisement or article in the ***CBIAC Newsletter*** does not constitute endorsement by the DoD or the CBIAC.

The CBIAC is located in building E3330, Room 150, Aberdeen Proving Ground-Edgewood Area, Maryland 21010. For further information or assistance, visit or contact the CBIAC.

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Defense Technical Information Center

By Sandy Schwalb

The **Defense Technical Information Center (DTIC)** has collected and distributed authoritative Department of Defense (DoD) scientific, research and engineering information for more than 60 years and:

- provides controlled access to DoD information
- is a vital link in the transfer of information among the defense-related government and civilian research and development (R&D) communities
- is a primary provider of Web services for organizations within the DoD

In 2004, DTIC became a DoD field activity in the office of the Undersecretary for Acquisition, Technology and Logistics (AT&L), reporting to the Director, Defense Research and Engineering (DDR&E).

R. Paul Ryan became DTIC's Administrator in November 2005. Of his appointment, Ryan said, "I have been with DTIC for over 20 years and my motto is 'mission first, people always.' I like to remind the DTIC staff that what we do everyday is important for the DoD and for our military members fighting for freedom around the globe."

How can DTIC help?

DTIC makes R&D dollars go farther by:

- Collecting, recording, reporting and distributing defense related R&D
- Cataloging millions of technical documents detailing billions of dollars in research
- Providing information support to the federal and contractor communities
- Building on prior knowledge.

Why "reinvent the wheel?" Sharing resources can be a boon to researchers, engineers, students, etc. who need information to produce new and better research that can lead to new and better technologies.

Registration is the Key

Due to the nature of the information that DTIC handles, users must qualify and register for services. Of the 15,000 DTIC registered users, more than one-half are DoD employees, with others from organizations contracted to the government, from non-DoD federal agencies, colleges, universities and research centers. The first step in getting information from DTIC is to register for services at: www.dtic.mil/dtic/registration/index.html.

What is found at DTIC?

Technical Reports database — more than 2,000,000 reports in print and nonprint formats conveying the results of defense-sponsored research, development, test, and evaluation efforts. Between 30,000 and 35,000 new documents added annually.

Research Summaries database — descriptions of DoD research in progress and available only to DTIC registered users. The collection consists of more than 300,000 active and inactive summaries from 1965 to the present.

Independent Research and Development database — more than 171,000 descriptions (dating back to the mid-70s) of R&D projects initiated and conducted by defense contractors independent of DoD control and without direct DoD funding. Nearly $3 billion dollars' worth of IR&D projects are submitted to DTIC annually. Accessible only to DTIC-registered, U.S. government employees, the information is used to identify contractors with expertise in areas of interest to DoD and to avoid DoD duplication of industry R&D efforts.

Technical Reports Automated Information List (TRAIL) — a free electronic mailing list that automatically distributes citations to DTIC's unclassified, unlimited technical reports recently added to the DTIC Technical Reports database.

STINET® Services — DTIC's flagship Scientific and Technical Information Network (STINET) is one of DoD's largest repositories of scientific and technical information currently available. There are three versions:

- Public STINET is available to the public, free of charge, and provides access to citations of unclassified, unlimited reports that describe the progress or results of research efforts and other scientific and technical information held by DTIC.
- Private STINET is a password-protected, value-added service for individuals who have registered with DTIC. It offers online full-text versions of unclassified, unlimited as well as limited documents.
- Classified STINET is on the Secret Internet Protocol Router Network (SIPRNET) and contains the complete DTIC collection, including unclassified, limited reports and classified citations. In order to use this service you

Continued pg. 12

Contract Awards • *By Mary Frances Tracy*

Construction of a Chemical, Biological, Radiological Sample Receipt Facility
John C. Grimberg Co. Inc., Rockville, MD
$27,049,000 September 28, 2006
By U.S. Army Corps of Engineers, Baltimore, MD

Use of It's Technology in Developing Treatments for the Ebola and Marburg Viruses
Vancouver's Protiva Biotherapeutics
Vancouver, British Columbia, Canada
$1,400,000 Grant September 20, 2006
By Defense Threat Reduction Agency, Fort Belvoir, VA

Consequence Response Decontamination Systems (CRDS)
TVI Corporation
Glenn Dale, MD
$1,200,000 September 18, 2006
By National Guard Chemical, Biological, Radiological, Nuclear or High Yield Explosive Enhanced Response Force Package, Washington, DC

Research for Treatment for Francisella tularensis, or Tularemia
Juvaris BioTherapeutics Inc.
Pleasanton, CA
$1,000,000 Grant September 14, 2006
By National Institute of Allergy and Infectious Disease, Bethesda, MD

Joint Counter Improvised Explosive Devices Laboratory, Indian Head, MD
John C. Grimberg Company, Inc.
Rockville, MD
$8,495,000 September 14, 2006
By Naval Facilities Engineering Command, Washington, DC

10 Million Doses of ACAM2000 Vaccine
Acambis, Cambridge, United Kingdom
$30,000,000 September 13, 2006
By Centers for Disease Control and Prevention (CDC), Atlanta, GA

Lassa Fever Antiviral Program
SIGA Technologies, Inc., New York, NY
$6,000,000 September 12, 2006
By National Institutes of Health, Bethesda, MD

Build Pan-Canadian Communicable Disease Surveillance System
IBM Canada, Markham, Ontario, Canada
$24,000,000 September 6, 2006
By Province of British Columbia, Vancouver, British Colombia

Develop Anthrax Treatment
Emergent BioSolutions, Gaithersburg, MD
$3,800,000 August 31, 2006
By U.S. National Institutes of Health, Bethesda, MD

Continued Chemical Agency Neutralization Operations
Parsons Infrastructure Technology Group, Pasadena, CA
$154,342,522 (part of $1,036,569,242) August 31, 2006
By U.S. Army Sustainment Command, Rock Island, IL

Business and Analytical Support for the Joint Program Executive Office, Chemical and Biological Defense Systems
Kalman &amp Co., Inc., Virginia Beach, VA
$9,582,905 August 30, 2006
By U.S. Marine Corps Systems Command, Quantico, VA

10,000 Therapeutic Courses of Treatment of Anthrax Immune Globulin
Cangene Corporation, Winnipeg, Manitoba, Canada
$143,800,000 August 29, 2006
By U.S. Department of Health and Human Services, Bethesda, MD

Integration and Upgrade of Analytical Laboratory Systems Assigned to National Guard Units
EAI Corp., Abingdon, MD
$22,459,000 August 28, 2006
By U.S. Army Research, Development, and Engineering Command, Aberdeen Proving Ground, MD

MRICD Hosts GW Program High School Student Presentations

By Cindy Kronman

For the third consecutive year, the U.S. Army Medical Research Institute of Chemical Defense (MRICD) hosted the closing day ceremony for students at Aberdeen Proving Ground participating in the George Washington (GW) University Science and Engineering Apprentice Program (SEAP). The SEAP offers high school students with an aptitude and interest in mathematics and science the opportunity to spend 8 weeks over the summer working in a Department of Defense laboratory. At the end of the apprenticeship students are required to prepare a paper and, on the closing day, to give a brief presentation on their project. This year's closing ceremony was held August 11.

MRICD scientists mentored 19 GW students this summer, while researchers at the U.S. Army Research, Development and Engineering Command mentored 24, and those at the U.S. Army Research Laboratory mentored 12. Program coordinators at each of the laboratories this year were Douglas Cerasoli and John McDonough at MRICD, Barbara Knapp at RDECOM, and for ARL, Darleen Buczkowski in the Survivability/Lethality Analysis Directorate, Barbara McGuire in the Computational and Information Sciences Directorate, and George Klem in the Weapons and Materials Research Directorate.

MRICD commander, Col. Brian J. Lukey, welcomed the students, their guests, and mentors, before the student presentations began. Addressing the parents in the audience, Lukey said, "You can be very proud of your children. The GW program is extremely competitive and very difficult to get into."

Dr. James Dillman demonstrates to GW students Jessyca Gordon and Steven Wise how to pipette a probe sample into a genechip microarray for hybridization and analysis of gene expression. (photo by Stephanie Froberg).

"Participation in the GW program," Lukey continued, "will increase these students' chances of getting into the college they want and getting the jobs they want in the future."

Attributing the superiority of the U.S. military to the research that DoD is performing, research that benefits not just the warfighter, but the nation overall, Lukey told the audience that the quality of this research is a result of the "intellectual aptitude of our scientists, the same scientists who volunteer to be mentors to these GW students."

One objective of the program is to expose promising students to science and mathematics in DoD laboratories to encourage the students to consider these laboratories when they are ready to join the workforce.

"The people, facilities, and resources of DoD laboratories are phenomenal. Consider them when you are ready to start your career," said Lukey, who admitted to being so impressed by such advantages during his first tour of duty at MRICD as a captain/researcher that he decided to stay in the Army.

Two former GW apprentices, now college students who work at MRICD during the summer under the Oak Ridge Institute of Science and Education (ORISE) Program, also shared their thoughts on SEAP with the audience.

William Wrobel, finishing up his fifth summer at MRICD, had spent his first two as a GW apprentice. A chemistry major at Boston College, Wrobel said his experiences at MRICD have provided many opportunities in college, some not generally available to undergraduates. This past year at Boston College, his sophomore year, he was named Chemist of Year.

Continued pg. 19

In the News • *By Mary Frances Tracy*

NIAID Awards $4 Million to Develop Anti-Radiation Treatments
NIH News
September 25, 2006
"The National Institute of Allergy and Infectious Diseases…has issued five awards totaling $4 million to fund the development of products that eliminate radioactive materials from the human body following radiological or nuclear exposure."
http://www.nih.gov/news/pr/sep2006/niaid-25.htm

Railroads to Upgrade Security at Terminals
Jennifer Maloney
Newsday
September 21, 2006
"The Long Island and Metro-North railroads have approved a joint contract for improving Grand Central Terminal's chemical detection system and installing one in the LIRR section of Penn Station…"
http://www.newsday.com/news/local/longisland/ny-lichem21490 0176sep21,0,5300427.story

The United Nations Purchases Anti-Nuclear Suits
Radiation Shield Technologies, Inc Press Release
September 18, 2006
"Radiation Shield Technologies, Inc. (RST) announced today that it was awarded an international tender issued by the International Atomic Energy Agency (IAEA). Under this tender, the IAEA has agreed to purchase Anti-Nuclear Full Body suits…"
http://biz.yahoo.com/prnews/060918/clm040.html?.v=64

U.S. Government Selects Biothera Compounds for National Radiation Countermeasure Evaluation
PRNewswire
September 18, 2006
"The National Institute of Allergy and Infectious Diseases…has selected two Biothera drug candidates for research in a new program designed to identify and facilitate the development of radiation and nuclear medical countermeasures."
http://sev.prnewswire.com/health-care-hospitals/20060918/ CGM02818092006-1.html

Biohazard Detector Invented in NZ
NewstalkZB
September 15, 2006
"A New Zealand invention which can almost immediately identify bacterial spores such as anthrax could be used by emergency services all over the world."
http://www.newstalkzb.co.nz/newsdetail1.asp?storyID=103787

Shelling Out Radiation
The Engineer Online
September 15, 2006
"A substance found in crab shells could be used to help remove radioactive materials from the human body in the event of a disaster such as the detonation of a dirty bomb."
http://www.e4engineering.com/Articles/296107/Shelling%20out %20radiation.htm

Chemical School Ramps Up Biological Training
Christian DeLuca
Fort Leonard Wood Guidon
September 13, 2006
"Fort Leonard Wood's Chemical Defense Training Facility integrated the use of a non-pathogenic biological agent into their ongoing training Aug. 1 to prepare Soldiers for updated field missions."
http://www4.army.mil/ocpa/read.php?story_id_key=9562

Drugs Would Reduce Venezuelan Equine Encephalitis Virus Bioterrorism Threat, Counter Natural Outbreaks
Jim Kelly
University of Texas Medical Branch Press Release
September 12, 2006
"Biomedical researchers at UTMB have taken an important early step toward developing effective drug therapies against Venezuelan Equine Encephalitis (VEE) virus, a potential bioterrorist weapon. Their achievement: determining the precise structure of a protein that the virus requires for replication."
http://www.utmb.edu/impact/stories/06SEPT11/vee.htm

Continued pg. 10

Vol. 3 No. 4 of the Chem-Bio Defense Quarterly Magazine is Now Available!

Vol. 3 No. 4 Chem-Bio Defense Quarterly Magazine

This issue of Chem-Bio Defense Quarterly Magazine, the last for 2006, features a number of articles that discuss the Collective Protection mission to develop, procure, field and dispose of equipment and systems that collectively protect personnel and equipment from chemical, biological, radiological and toxic industrial chemical contamination. Also featured is Dr. Chuck Gallaway, Director of the Chemical and Biological Technologies Directorate and the Joint Science and Technology Office. We also take an in depth look into the Software Support Activity as well as introduce the newest Joint Project Managers for the Joint Program Executive Office for Chemical and Biological Defense.

To view the electronic version, visit: http://www.jpeocbd.osd.mil/page_manager.asp?pg=4&sub=0

Would you like to receive the link to upcoming issues or have a hard copy version for your office or organization? If so, complete the interactive form at http://www.jpeocbd.osd.mil/page_manager.asp?pg=0&sub=9.

Commitment to Safety Boasts 15 Years of No Lost-Time Accidents

By Greg Mahall

The Chemical Demilitarization Training Facility (CDTF) located at Aberdeen Proving Ground celebrated its 15th consecutive year without a lost-time accident in August.

A lost-time accident includes any job-related injury or illness resulting in an employee missing at least one full day of work.

"Strict safety standards; mandatory safety training for students and personnel; and individual, hands-on instruction in an agent-free environment all have helped keep the CDTF free of lost-time accidents for more than 15 years," said U.S. Army Chemical Materials Agency (CMA) Director Michael Parker.

The facility's training program began in 1989 as an addendum to Congress' 1985 Department of Defense directive to safely dispose of the nation's chemical weapons stockpiles located at eight sites around the country and one outside of Hawaii.

A student fully encapsulated in a protective suit at the Chemical Demilitarization Training Facility at Aberdeen Proving Ground, Maryland, rolls a simulated waste barrel in the Demilitarization Equipment Room. The facility recently celebrated a perfect safety record of no lost-time accidents in the past 15 years. (Photo by CDTF graphics department)

In order to operate and maintain these facilities, officials decided to construct a facility for providing programmatic training support to demilitarization personnel.

A division of DoD, CMA contracted the construction and operation of this facility to General Physics, a company based in Elkridge, Maryland, specializing in performance improvement services and products.

Parker said he recognizes the value of the facility and the safe demilitarization practices exhibited and learned by its personnel.

"The CDTF's perfect safety record for the past 15 years is an excellent example of the Army's commitment to safely destroying the nation's chemical weapons stockpile," Parker said. "The lessons given and learned at the facility ensure that workers at our disposal sites take the appropriate safety measures as they destroy the chemical weapons."

Since its beginning, the facility has instituted programs consistent with work force skill requirements for demilitarization facilities.

The training program at the facility includes 280 laboratory, maintenance, operations and emergency response training courses equaling more than 9,000 hours of curriculum hours. General safety, health and environmental training are also offered.

The facility's instructors have trained more than 51,000 students. This number includes contractors, government oversight officials and international inspectors.

The duration of classes at the facility ranges from as few as 10 days to as long as three months. Course delivery includes a mixture of classroom instruction followed by hands-on exercises, all taught in non-toxic environments. Training provided is based on the performance of selected job criteria and is designed to help students easily transfer skills to the demilitarization sites. Courses are continually evaluated to ensure accuracy and effectiveness and revised as the work force evolves. In addition to the training programs, the CDTF houses a test and evaluation team that provides technical support.

Fifteen years without a lost-time accident is a tribute to the safety culture established at the CDTF.

"Everybody knows the rules and what they're supposed to do," said Beverly Bunch, CDTF Safety, Health and Environmental leader. "We hold mandatory safety training every month hosted by different departments that showcase special safety messages. There is also a lot of peer support. We look out for one another to make sure everyone is a player in the safety program."

Odis Elston, a senior automatic continuous air monitoring system technician, began his training at the CDTF in October 2003 as a requirement for a monitoring station position at the Anniston Chemical Agent Disposal Facility in Anniston, Alabama. He spent 30 days at the CDTF where he took "Lab Essentials" and "Depot Area Air Monitoring Systems" training. Elston finished his initial training in ACAMS classes, where students learn how to repair air monitoring equipment used at the demilitarization sites. After his primary training, Elston worked at monitoring stations in Anniston before returning to the CDTF in August to expand his monitoring capabilities. Small class sizes, such as the ACAMS lab, allow instructors more one-on-one time with each student.

"At the CDTF, it is safety first," Elston said. "Safety is stressed every day in the lab. Before you begin any task you must make sure you have the proper personal protective

Continued pg. 19

CBIAC 20 Years *cont.*

warfighters; and federal, state and local government agencies and first responders. The CBIAC also supports private sector government contractors in industry and academia. *Bringing the CBRN Defense and Homeland Security Communities Together* has become the best description of the CBIAC's mission.

Scope

In 1999, the CBIAC scope was expanded to include Force Protection, Counterterrorism, Counterproliferation, and Domestic Preparedness. Currently, the CBIAC Scope includes all aspects of CBRN Defense and Homeland Security.

- Analysis of Manufacturing Processes for Nuclear, Biological and Chemical (NBC) Defense Systems
- Chemical and Physical Properties of CB Defense Materials
- Chemical Identification
- Combat Effectiveness
- Counterproliferation
- Counterterrorism
- Decontamination
- Defense Conversion and Dual-Use Technology Transfer
- Demilitarization
- Domestic Preparedness / Homeland Security
- Environmental Fate and Effects
- Force Protection
- Individual and Collective Protection
- International Technology Proliferation and Arms Control
- Medical Effects and Treatment
- Nuclear, Biological and Chemical Survivability
- Radiological and Nuclear Defense
- Smoke and Obscurants
- Toxic Industrial Chemicals and Toxic Industrial Materials
- Toxicology
- Treaty Verification and Compliance
- Warning and Identification

Programs

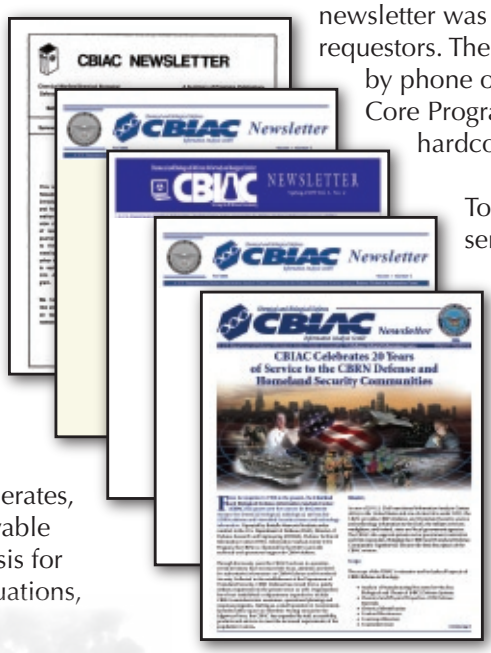
Acting as a storehouse of CBRN information, the CBIAC collects, organizes, processes, analyzes, generates, and disseminates data in ways that are easily retrievable and readily usable, targeting information and analysis for specific applications over a wide range of users, situations, and technologies.

Originally, the CBIAC was divided into two key programs, the Core Program and the Technical Area Task (TAT) Program. As the knowledge base and information handling requirements of the CBIAC expanded over time, it was determined that a third program would be beneficial to our user community. The Knowledge Management and Development (KM&D) Program was developed to create tailored decision-making tools and products that provide real-time access to scientific, technical, and functional information.

CBIAC services are now available through these three different, but mutually supporting, programs. CBRN Defense information research, identification, acquisition, analysis, synthesis, generation, and dissemination are the identifying features of the **Core Program**. Offered at little or no cost to authorized users, the Core Program provides information resources and analysis, basic products, inquiry and referral services, and current awareness and promotions. The **TAT** and **KM&D Programs** supply specialized analytical and technical work at costs commensurate with the scope, complexity, and duration of each project while project deliverables directly contribute to the Core Program's technical holdings and capabilities.

The Core Program

Originally, the CBIAC Core Program's archive consisted of the commitment to establish a hardcopy collection of CB Defense documents on site and to populate a database with citations to the CBIAC's document collection. A quarterly newsletter was initiated and mailed or handed out to requestors. The Inquiry and Referral service, handled by phone or in person, was the hub of the CBIAC's Core Program activity. Information products in hardcopy format were developed as well.



Today, the principal CBIAC Core Program services include responses to technical inquiries (up to 4 hours of free service) in any of our scope areas, newsletter subscriptions, our publicly-accessible Web site, and regular email updates. CBIAC products, in both hardcopy and electronic format, are sold on a cost-recovery basis. The ***CBIAC Newsletter*** is one of our principal outreach mechanisms, mailed in hardcopy format to over 2,000 individuals and organizations and archived on the CBIAC Web site.

Continued pg. 9

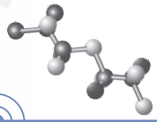
1986

Halabja Poison Gas Attack
1988

The Gulf War: 1990-1991
Desert Shield: 1990
Desert Storm: 1991

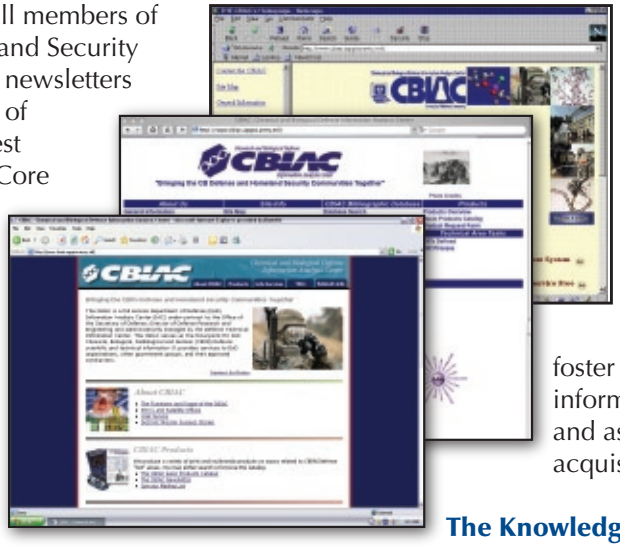
United Nations Special Commission (UNSCOM)
1991

Sarin Attack, Matsumoto, Japan
1994



Sarin Attack on Tokyo Subway
1995

CBIAC 20 Years *cont.*



Subscriptions are provided to all members of the CBRN Defense and Homeland Security communities at no charge. The newsletters offer a vehicle to inform others of your activities in areas of interest to our community. The CBIAC Core Program also maintains a vastly expanded centralized repository of CBRN Defense and Homeland Security scientific and technical information, known as CBRN START, which consists of over 130,000 database records and over 106,000 documents in electronic format. Individuals and organizations are encouraged to contribute their documents and information collections in areas related to the CBIAC scope and mission to this repository. In addition to the document database, the CBIAC's Subject Matter Experts (SME) database provides the Inquiry and Referral Services team and CBIAC customers a reach-back capability to a diverse group of more than 1200 scientists and engineers with broad experience in CBRN Defense. The CBIAC SMEs are professionals from academia, Department of Defense, other Federal agencies, State, Local and Municipal government, industry, and the emergency response community.

CBIAC product sales are limited to requestors who meet the requirements of the distribution statement for each item. CBIAC products have expanded to include electronic and hard copy items produced in specialized formats to meet the needs of particular groups of users. Simulant kits for use in training are now available as well. Over the last few years, the CBIAC has managed the distribution of a wide variety of items for Government organizations at their request. This service is available at no cost to the contributing agency.

Technical Area Task (TAT) Program

The TAT Program provides a competitively awarded, quick, convenient and responsive contract vehicle to support larger scale technical and operational efforts. Originally, TAT business came primarily from the developers of Army systems. Currently, TATs support DoD, all services, many other Federal Agencies, states, and some commercial requesting activities.

The TAT program provides clients with access to subject matter experts and state-of-the-art facilities. As analytical and technical efforts requiring work beyond the Core Program services, TATs provide valuable R&D support to the CBRN Defense technical community, as well as supporting preparation of specialized products and services. TATs also expand access to and increase the use of the CBIAC information repository; provide a means to develop specialized information collections; foster awareness of the importance of CBRN Defense information; improve the capabilities of U.S. forces; and assist the CBRN Defense community in the acquisition of information.

The Knowledge Management and Development (KM&D) Program

Defined as a third program and resource to support the CBRN Defense and Homeland Security communities in 1999, the KM&D Program integrates subject matter expertise, content research, and dissemination technologies as it collects, analyses, synthesizes, and disseminates CBRN Defense and Homeland Security scientific, technical, and functional knowledge. The KM&D program offers:

- Authoritative information resources and decision support systems
- Taxonomy, semantic tools, and metadata production
- Legacy system and data migration
- Hosting in compliance with DoD regulations
- Web-based interoperability system deployment and hosting
- Classified data management.

For 20 years, the CBIAC has been dedicated to providing outstanding products and services to the CBRN Defense and Homeland Security communities. CBIAC's achievements during this period are a testimonial to the collective efforts and the commitment of the entire CBIAC Team to providing timely, complete, and authoritative scientific and technical information solutions to the communities it serves.

For further information or to access the CBIAC products and services, visit our Website at http://www.cbiac.apgea.army.mil.

Timeline photo credits: see page 10.

CWC Entered into Force and OPCW formally established
1997

United Nations Monitoring, Verification, and Inspection Commission (UNMOVIC)
1999

Attack on the World Trade Center and Pentagon
2001

Anthrax Letters
2001

Department of Homeland Security established
2002

Operation Iraqi Freedom
2003

2006

CBIAC Receives Prestigious Security Award

The Chemical and Biological Defense Information Analysis Center was named a winner of the James S. Cogswell Outstanding Industrial Security Achievement Award at a ceremony in San Diego, California, September 27, 2006.

The Cogswell Award, bestowed by the U.S. Defense Security Service (DSS), is presented annually to a select group of defense contractors for outstanding achievement in matters related to a facility's security program. It is the most prestigious honor the DSS can award to cleared industry.

Established in 1966, the award is named in honor of the late Air Force Col. James S. Cogswell, who was the first chief of the unified office of Industrial Security. He was responsible for developing the basic principles of the Industrial Security Program, which includes an emphasis on the partnership between industry and government to protect classified information.

The criteria for the award include establishing and maintaining a security program that goes well beyond the basic National Industrial Security Program requirements and providing leadership to other cleared facilities in setting high standards for security. The Cogswell Award is given for outstanding achievement in matters related exclusively to a facility's security program.

The Cogswell Award selection process is rigorous. Facilities can only be nominated by an Industrial Security representative if they have at least two consecutive superior industrial security review ratings and they show a sustained degree of excellence and innovation in overall security program management, implementation and oversight.

"The CBIAC is honored to receive this recognition for our security program," said Ron Evans, Director of the CBIAC. "Our staff members work diligently to make security a top priority because they know it's important for our service members and our country."

For more information, visit www.battelle.org or contact National Media Relations Manager Katy Delaney at (410) 306-8638 or at delaneyk@battelle.org.

In the News *cont.*

New Computer Model Concept Could Solve Big, Real-World Problems On A Small, Porous Scale

PNNL News Release

September 7, 2006

"The Department of Energy's Pacific Northwest National Laboratory today was awarded a Scientific Discovery through Advanced Computing, or SciDAC, grant to develop a computer model that can simulate biogeochemical processes on multiple scales…make more accurate predictions of the movement and fate of contaminants in groundwater…"

http://www.pnl.gov/news/release.asp?id=185

Certification Process Sponsored by U.S. Department of Homeland Security And Conducted by AOAC INTERNATIONAL

Response Biomedical - News Releases

September 5, 2006

"Response Biomedical Corporation announced today that the Company's RAMP Anthrax Test is the first and only biodetection technology on the market approved for field use by first responders in the United States for the detection of anthrax."

http://micro.newswire.ca/release.cgi?rkey=1409052509&view=31910-0&Start=0

Texas Tech Researchers Make Chemical Warfare Protective Nanofibers

Texas Tech University Staff Release

August 28, 2006

"While cotton may be the fabric of our lives, Texas Tech University researchers may have discovered a polyurethane nanofiber technique that can save lives…a honeycomb polyurethane nanofabric by using electrospinning"

http://www.depts.ttu.edu/communications/news/stories/06-08-nanofibers.php

CSU Leads Attack On TB

Bill Scanlon

Rocky Mountain News

August 28, 2006

"The federal government's fear of tuberculosis as an instrument of bioterrorism helped Colorado State University win $7.8 million in grants this month to search for treatments and vaccines for the bacteria."

http://www.rockymountainnews.com/drmn/local/article/0,1299,DRMN_15_4950331,00.html

CBIAC 20 Years: Timeline Photo Credits

Page 8, left to right: ***Halabja,*** *http://en.wikipedia.org/wiki/Image:Halabja1.jpg;* ***Desert Storm planes,*** *http://en.wikipedia.org/wiki/Image:USAF_F-16A_F-15C_F-15E_Desert_Storm_pic.jpg;* ***Burning oil wells,*** *http://en.wikipedia.org/wiki/Image:Oil_well_firess.gif;* ***Japan,*** *http://geography.about.com/library/blank/blxjapan.htm;* ***Sarin molecule,*** *courtesy of Battelle.*

Page 9, left to right: ***CWC,*** *http://www.cwc.gov/cwc.html;* ***UN logo,*** *http://www.un.org/english/;* ***Pentagon wall,*** *http://www.defenselink.mil/photos/NewsPhoto.aspx?NewsPhotoID=3573;* ***Anthrax letter,*** *http://en.wikipedia.org/wiki/Image:Daschle_letter.jpg;* ***DHS logo,*** *http://www.dhs.gov;* ***Operation Iraqi Freedom,*** *http://www.defenselink.mil/photos/NewsPhoto.aspx?NewsPhotoID=5559*

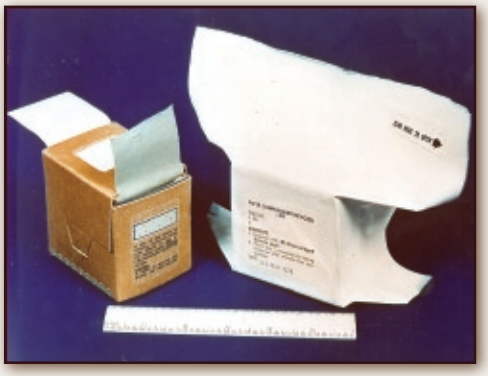
History of Chemical and Biological Detectors, Alarms, and Warning Systems†

Mr. Jeffery K. Smart, Command Historian

THE 1980's

Chemical Agent Detectors

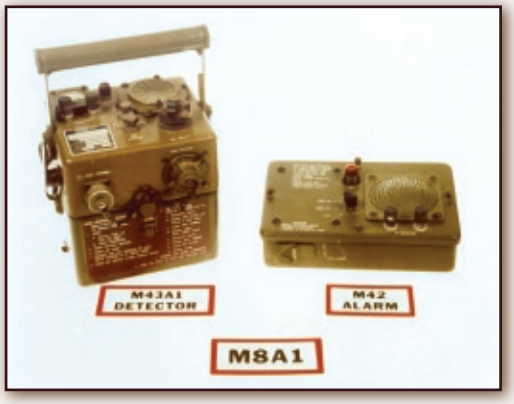
M9 Chemical Agent Detector Paper



The concept of a liquid agent detector paper that could be attached to a soldier's uniform was investigated for several years. The result was M9 Detector Paper. The paper consisted of B-1 detector dye that changed color when contaminated with liquid agent. It came in a roll two-inches wide by 30 feet contained in a tear off type dispenser. Prior to adoption, testing revealed that the B-1 dye was mutagenic and possibly carcinogenic. The Army still chose to adopt M9 Detector Paper in 1980 and then found a replacement detector dye that was not mutagenic.[1]

M8A1 Automatic Chemical Agent Alarm

The M8A1 Alarm was standardized in 1981 with the new M43A1 Ionization Detector. Existing M8 Alarms were upgraded by replacement of the old detector. The M43A1 Detector eliminated the electrolyte solution passing through an electrochemical cell and instead used an alpha radiation source for detection. A pump drew air samples into the detector unit and then through a heater and filter. Contaminated air passed over an alpha radiation source that caused the chemical agent ions to cluster. A geometrically configured cell collected the clusters as electric current while a monitor sensed any voltage change. Any voltage change activated the alarm. The M8A1 Alarm became the Army's single most important chemical detection capability and by 1987, over 32,000 units were in the field. During Operation Desert Shield/Storm in 1990-1991, the U.S. Army utilized over 12,000 M8A1 Alarms as the main detection capability for chemical defense.[2]



M272 Chemical Agents Water Testing Kit

The need for a replacement of the M2 Water Testing and Screening Kit led to the development of the M272 Chemical Agents Water Testing Kit. The kit was adopted in 1983 for field use. It was lightweight, compact, expendable, and easy to use. The kit could detect most chemical agents in raw and treated water. It also contained simulants for training. It was intended for Quartermaster and Medical personnel to verify that water was free from chemical contamination.[3]

M256A1 Chemical Agent Detector Kit

One complaint with the M256 Chemical Agent Detector Kit was that a more sensitive nerve agent test was needed in the sampler/detectors. To improve the sensitivity, eel enzyme was substituted for the original horse enzyme. The improved kit was designated the M256A1 Chemical Agent Detector Kit and was adopted for field use in 1986. The M256A1 Kit was used extensively during Operation Desert Shield/Storm.[4]

Chemical Agent Monitor (CAM)

The urgent need for a lightweight hand-held chemical detector and the movement to microprocessors was reflected in the development of the Chemical Agent Monitor (CAM), type classified limited procurement in 1985 and standardized in 1988. It was a hand held device for monitoring chemical agent contamination on personnel and equipment. The small unit weighed about five pounds. The CAM detected vapors by sensing molecular ions of specific mobilities and used timing and microprocessor techniques to reject interferences. The CAM was based on a United Kingdom (U.K.) design originally standardized by the U.K. back in 1984. Fielding of the CAM began in 1988.[5]

Continued pg. 18

†This article is Part V of a series of articles extracted from the ***History of Chemical and Biological Detectors, Alarms, and Warning Systems***, by Mr. Jeffery K. Smart, U.S. Army Research, Development and Engineering Command (RDECOM) Historian, June, 2000. This presentation is edited, with permission of the author, for the CBIAC Newsletter forum.

DTIC *cont.*

must be able to access the SIPRNET and have registered with DTIC.

STINET's MultiSearch, available in both Public and Private STINET, is a portal to the "deep-Web" for government scientific and technical information. It searches below the "surface" Web for information not accessible through commercial and government search engines.

DTIC's free Scheduled Search service is available to Private STINET registered users and provides the latest information in a particular subject area of interest.

Where the Information Comes From

DTIC information is derived from many sources: DoD organizations (civilian and military) and DoD contractors; U.S. government organizations and their contractors; non-profit organizations working on DoD scientific, research, and engineering activities; academia; and foreign governments.

Why provide DTIC with information? It is required by DoD Directive 3200.14, which mandates that DoD research, including that done in-house and/or by contractors and grantees, should be part of the DTIC collection. In other words, if there is great technology in the DoD, DTIC should have that information for others to use and build upon.

DTIC gets information from the defense community, for the defense community, about defense and beyond. Having a full range of science and technology and research and development information within DTIC ensures that technological innovations are linked to defense development and acquisition efforts. New research projects can begin with the highest level of information available. This, in turn, maximizes the use of DoD project dollars.

Enhanced Search Capability

Late in 2005, DTIC's Web site (www.dtic.mil) began to look more like other well-known Internet search engines by offering users the option of conducting a simple search in three separate resources:

- DTIC Science and Technology (S&T) – Publicly available information from the DTIC Technical Reports collection with an advanced search capability
- DoD Wide Science and Technology – S&T-related sites throughout the DoD with the ability to narrow the search to the DoD Laboratory community or specific organizations
- All DoD Web Sites – Public Defense information throughout the Department or by agencies, unified commands, Military Services or other DoD components.

The revamped DTIC homepage links you directly to a search engine. Why the redesign? The key reason people come to the DTIC Web site is to find information, so this new page allows them to get down to business immediately. There are several ways to refine a search—from narrowing it only to DTIC's scientific and technical database or searching all DoD-wide Web sites. There are links to other Internet search engines and resources such as first.gov and science.gov and one that allows for a search of 10 different federal databases simultaneously. DTIC wanted to ensure that its homepage was more in line with what people are used to seeing on other search engines, while offering them flexibility. As always, you can access other DTIC products and services through the DTIC homepage: http://www.dtic.mil/dtic/index.html

DTIC Open Archive Initiatives (OAI)

Also in 2005, DTIC launched its Open Archives Initiative (OAI), providing broader access to information in DTIC's collection. OAI is an international effort focused on furthering the interoperability of digital libraries and its objective is to develop a framework to make it easier to find content stored in distributed archives.

Much authoritative information has resided on the "deep Web," comprised of content-rich databases from universities, libraries, associations, businesses and government agencies, including DTIC. Until the advent of the OAI, this information could be found using commercial search engines such as Google, Ask.com, Dogpile and AltaVista, to name a few.

This is another way to make sure DTIC's customers find the data they need, which is more relevant to their work. If one is looking for something defense-related using a typical Internet search engine, the record from DTIC will show up—we want to ensure that the material in our collection is linked to us (and not a commercial Web site) so there will be a connection back to the DTIC.

Research and Engineering (R&E) Portal

Since its launch in 2005, the R&E Portal (https://rdte.osd.mil) has provided access to an ever-increasing selection of scientific and technical information. Through a single point of entry, DoD employees and their contractors, federal government employees and their contractors, and foreign government employees can search DTIC's historical collections and other government Web sites. The Portal brings together 21 Web applications that support DDR&E strategic planning and the congressional reporting process. The Defense Technology Search tool allows users to search across libraries from one search request, providing information in a context that is meaningful to the S&T community.

New features on the R&E Portal include:

(1) a single sign-on to provide the R&E community with quick and easy access to comprehensive technical information.

Continued pg. 13

DTIC *cont.*

(2) the Interactive Customer Evaluation (ICE) System, which provides a comment card. This online form allows users to provide feedback on their experience in using the Portal.

Upcoming additions to the Portal include an email notification system, personalized pages, an online tutorial, and R&E blogs.

Information Analysis Centers (IACs)

DTIC manages and funds contractor-operated joint service-oriented IACs (http://iac.dtic.mil), which are research organizations. Chartered by the DoD, IACs identify, analyze, and use scientific and technical information in specific technology areas. They also develop information and analysis products for the defense science and engineering communities and are staffed by experienced technical area scientists, engineers and information specialists. The DTIC-managed IACs are: AMMTIAC: Advanced Materials, Manufacturing and Testing Information IAC, CBIAC: Chemical and Biological Defense IAC, CPIAC: Chemical Propulsion IAC, DACS: Data and Analysis Center for Software, IATAC: Information Assurance Technology Analysis Center, RIAC: Reliability IAC, SENSIAC: Military Sensing IAC, SURVIAC: Survivability/Vulnerability IAC and WSTIAC: Weapon Systems Technology IAC.

Iraqi Virtual Science Library

On 3 May, 2006, DTIC participated in the "roll-out" of the Iraqi Virtual Science Library (IVSL), which gives Iraqi scientists, engineers and university students access to more than 17,000 full-text journal articles on cutting-edge developments in science and technology, online training and educational materials and information about funding opportunities, all provided free. DTIC was responsible for "building" the IVSL as part of a public-private partnership that includes components of the DoD, Departments of State and Energy, 13 publishers of scientific journals and technology companies. During the current pilot phase of the project, several hundred researchers will use the library and help DTIC improve the Web site. Eventually, operation of the Web site will be turned over to the Iraqis.

Supporting the Warfighter

DTIC worked with the U.S. Army's Topographic Engineering Center to provide urgently needed information to deployed military forces. The first instance was in response to the catastrophic landslides on the Philippine island of Leyte; followed by a request for research results related to water loss by troops in a desert environment; and the third request was in anticipation of the imminent eruption of Mount Merapi on the island of Java in Indonesia.

DTIC identified relevant documents through online searches as well as manual searches of the non-electronic information catalogs. Any non-digitized documents were immediately converted to electronic format (PDF) and supplied via email or on CD-ROMs. In addition, the DTIC Reference Team was able to refer the requester to additional online resources, which contained related information.

It is interesting to note that older research (from the 1940's through the 1990's) frequently was the most germane. In particular, the World War II research on desert warfare was useful in responding to the question regarding water loss.

DTIC has been successful in providing information to the defense community by knowing how to present information. No matter what the medium, content or dissemination method, DTIC's job has always been to help people use information as efficiently as possible to strengthen the nation's defense.

Calendar of Events

Do you have a Chemical and/or Biological Defense or Homeland Security course or event to add to our Calendar? Submit the pertinent information via email to **cbiac@battelle.org** *or online at* **http://www.cbiac.apgea.army.mil/info/posting_request.php**. *The CBIAC reserves the right to reject submissions. For a more extensive list of events, view our online calendar at* **http://www.cbiac.apgea.army.mil/info/calendar_06.php.**

2007

January 8-12
COURSE: Hospital Management of Chemical, Biological, Radiological/Nuclear, and Explosive Incidents (HM-CBRNE)
Aberdeen Proving Ground, MD
https://ccc.apgea.army.mil/courses/in_house/brochureCBRNE.htm

January 8-12
2007 Chemical and Biological Information Systems (CBIS) Conference & Exhibition
Austin, TX
http://www.ndia.org/Template.cfm?Section=7320&Template=/ContentManagement/ContentDisplay.cfm&ContentID=14415

January 9-10
2nd Annual CBRN Conference
Washington, DC
http://www.marcusevans.com/events/CFEventinfo.asp?EventID=11460

January 31 - February 2
WEST 2007
San Diego, CA
http://www.west2007.org/

February 5-9
COURSE: Field Management of Chemical and Biological Casualties
Aberdeen Proving Ground, MD
https://ccc.apgea.army.mil/courses/in_house/brochureFCBC.htm

February 6-7
Homeland Security: The Ripple Effect
Washington, DC
http://www.apus.edu/disaster

February 10-15
2007 NEMA Mid-Year Conference
Alexandria, VA
http://www.nemaweb.org/

February 19-23
2007 Local, State & Federal Public Health Preparedness Conference
Washington, DC
http://www.naccho.org/conferences/phprep06/index.cfm

February 20-21
IV International Congress for Victims of Terrorism
Oklahoma City, OK
http://www.victimscongress.org/

February 25 - March 1
PITTCON®2007
Chicago, IL
http://www.appcluster05.com/app/homepage.cfm?appname=376&moduleid=858

February 26-28
18th Annual Special Operations / Low Intensity Conflict Symposium & Exhibition
Arlington, VA
http://www.ndia.org/Template.cfm?Section=7880&Template=/ContentManagement/ContentDisplay.cfm&ContentID=12340

February 22-25
VFCA 2007 Mid-Atlantic Expo & Symposium
Virginia Beach, VA
http://www.vfca.us/2006_expo_&_symposium.htm

February 27- March 2
5th ASM Biodefense and Emerging Disease Research Meeting
Washington, DC
http://www.asmbiodefense.org/7200.asp

March 5-8
Net Centric Operations
Norfolk, VA
http://www.ndia.org/Template.cfm?Section=7120&Template=/ContentManagement/ContentDisplay.cfm&ContentID=11985

March 11-16
COURSE: Medical Management of Chemical and Biological Casualties
Ft. Detrick and Aberdeen Proving Ground, MD
https://ccc.apgea.army.mil/courses/in_house/BrochureMCBC.htm

March 17-22
The 46th Annual Navy Occupational Health and Preventive Medicine Conference
Hampton, VA
http://www-nehc.med.navy.mil/Conference07/Index.htm

April 13-15
Joint Senior Leader's Course (JSLC)
Fort Leonard Wood, MO
http://www.wood.army.mil/usacmls/usacmlsflash/flashindex.aspx

April 14-20
CBMTS-Industry V
Dubrovnik, Croatia
http://www.asanltr.com/cbmts/cbmts-industry/V/CBMTS_%20Industry_V.html

The U.S. Army Medical Research Institute of Chemical Defense is Awarded a $14.4 Million Center of Excellence Grant from the National Institutes of Health

Center for Catalytic Bioscavenger Medical Defense Research will Advance a Therapeutic Concept Developed by the Department of Defense

The National Institutes of Health (NIH) has announced the award of a "Countermeasures Against Chemical Threats (CounterACT) Research Center of Excellence" grant worth $14.4 million over 5 years to the U.S. Army Medical Research Institute of Chemical Defense (USAMRICD) at Aberdeen Proving Ground, Maryland. The Institute is the Department of Defense's premiere laboratory for the development of medical products against the effects of toxic chemicals. The NIH CounterACT program addresses the critical need for improved antidotes for civilian populations vulnerable to chemical agent poisoning by a terrorist attack. The competitive funding opportunity was available for all U.S. academic, industrial, and government laboratories.

Led by the center's principal investigator, Dr. David Lenz, the new NIH Center for Catalytic Bioscavenger Medical Defense Research at the USAMRICD will build upon the established infrastructure and personnel resources at the USAMRICD and at the national and international collaborating institutions. The partner organizations include the Human Biomolecular Research Institute, San Diego; The Weizmann Institute in Israel; the Department of Plant, Cellular, and Molecular Biology, The Ohio State University; The Biodesign Institute at Arizona State University; and the Department of Chemistry, The Ohio State University.

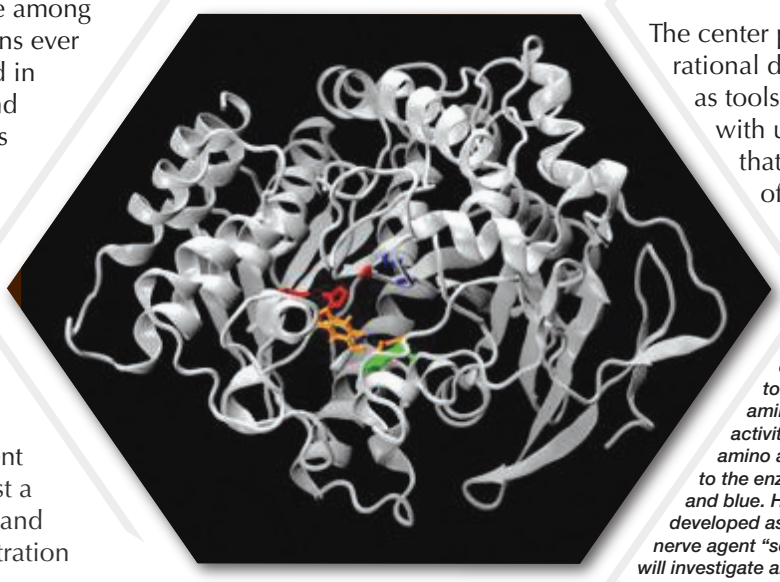
"Nerve agents, such as sarin, are among the most lethal chemical weapons ever developed. They have been used in wars as recently as the 1980s and by terrorist organizations such as in the subway attacks in Japan in the mid-1990s," says Dr. David Moore, Director of Strategic Research Program Development at the USAMRICD. The possibility of future use of these nerve agents by terrorists requires the urgent development of effective and safe antidotes. A pretreatment (or prophylactic) effective against a broad spectrum of nerve agents and capable of reducing the concentration of nerve agent in the blood before it can reach its site of action should be particularly effective as an antidote. Likewise, a very rapid onset therapy that could specifically reduce the concentration of the nerve agent poison in circulation would be more advantageous than the currently available therapeutic drugs. The concept of designing a safe and effective nerve agent bioscavenger addresses the strategic need for improved preventative and therapeutic drugs.

The Center will provide for a comprehensive collection of scientific and technological capabilities needed to address this novel drug discovery and drug production challenge. The Center will align collaborative research efforts between the USAMRICD and five other research groups. The USAMRICD is responsible for the overall administration of the Center and the management of the $14.4 million award over 5 years.

The Center for Catalytic Bioscavenger Medical Defense Research is based on two interlocking themes, one based on biochemical and molecular biological approaches to the design of human proteins with unique catalytic activity, and one based on genetic engineering of plants such that they will express proteins of human origin in high yield, both bolstered by the ability to provide critical facilities for demonstrating proof of concept sufficient for transition of a potential drug for advanced development and human clinical trial testing.

The center places heavy emphasis on both rational design and molecular evolution as tools for the design of human proteins with unique catalytic activity such that they can catalyze the hydrolysis of all currently identified nerve agent chemical warfare threats,

Continued pg. 17

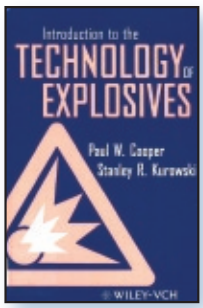


The structure for human butyrylcholinesterase is shown as a ribbon diagram form, with those portions of the molecule that are structurally similar to each other depicted in purple or yellow. The amino acids that play a role in the catalytic activity of the enzyme are shown in red, and those amino acids that assist in binding of the substrate to the enzyme are depicted in green, orange, yellow and blue. Human butyrylcholinesterase is being developed as a potential nerve agent prophylaxis or nerve agent "scavenger". The new "Center" at USAMRICD will investigate and develop additional bioscavengers.

New CBIAC Information Resources • *By Richard M. Gilman*

Books

Cooper, Paul W. and Stanley R. Kurowski. **Introduction to the Technology of Explosives**. New York: Wiley-VCH, 1996.

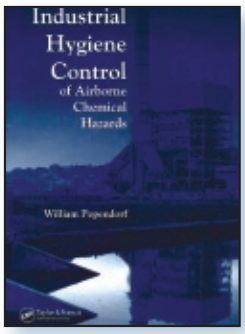


"Introduction to the Technology of Explosives deals with the various technologies used in the design and application of explosives and explosive systems. The intent of the book is twofold: (1) to provide the inexperienced worker in the field with sufficient background to understand problems that may arise and to facilitate interaction with specialists in the field; and (2) to provide an awareness of the crucial importance of safety in dealing with explosives to be obtained (one hopes) through a combination of technical knowledge and an appreciation of the various laws, statutes, codes, and common practices in the field…" (*authors' preface*).

Includes numerous illustrations, tables, graphs and an index.

CB-193961
ISBN 0-471-18635-X Wiley-VCH, Inc.
Wiley Publishing
10475 Crosspoint Blvd.
Indianapolis, IN 46256
Phone: 800.762.2974 Fax: 800.597.3299

Popendorf, William. **Industrial Hygiene Control of Airborne Chemical Hazards**. Boca Raton, FL: CRC Press, 2006.

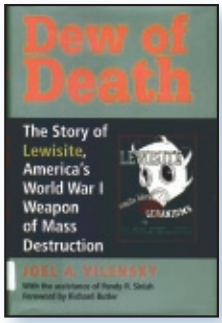


"The approach in this book to learning how to control chemical hazards tries to bridge the gas between our existing knowledge of physical principles and mechanisms that underlie the generation and dispersion of airborne chemicals and the wealth of recommendations, techniques and tools accumulated by prior generations of IH practitioners to control chemical hazards. This book assumes that the reader is academically trained in science and math, has seen at least a small number of manufacturing or other work settings with chemical hazards, but is inexperienced in the selection, design, implementation, or management of chemical exposure control systems…" (*preface*)

Includes numerous illustrations, tables, graphs and an index.

CB-035278
ISBN 10-0-8493-9528-3
CRC Press
Taylor & Francis Group
6000 Broken Sound Parkway NW, Suite 300
Boca Raton, FL 33487
Phone: 800.272.7737 Fax: 800.374.3401

Vilensky, Joel A. **Dew of Death—The Story of Lewisite, America's World War I Weapon of Mass Destruction**. Bloomington, IN: Indiana University Press, 2005.

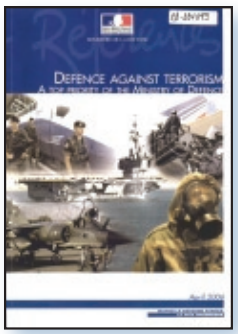


"Joel A. Vilensky tells the intriguing story of the discovery and development of this weapon and its curious history. During World War II, the United States produced more than 20,000 tons of Lewisite, testing it on soldiers and secretly dropping it from airplanes. In the end, the substance was abandoned as a weapon because it was too unstable under most combat conditions. But a weapon once discovered never disappears. It was used by Japan in Manchuria and by Iraq in its war with Iran. The Soviet Union was once a major manufacturer. Strangely enough, although it was developed for lethal purposes, lewisite led to an effective treatment for a rare neurological disease." (*publisher's advertisement*)

CB-193971
ISBN 0-253-34612-6
Indiana University Press
601 North Morton St.
Bloomington, IN 47404
Phone: 800.842.6796

Documents

French Ministry of Defence. **Defense Against Terrorism: A Top Priority of the Ministry of Defence**. Paris: Ministry of Defence, 2006.
http://www.defense.gouv.fr/sites/defense/english_contents/files/defence_against_terrorism120



"France, like its European partners, is directly concerned with the terrorist threat, home and abroad. It has long demonstrated its commitment to combating terrorism in all its forms, regardless of the perpetrators' identity…With the terrorist threat spreading since the 9/11 attacks and going increasingly international, and with sensitive areas developing worldwide, the military aspect in the fight against terrorism plays a more prominent role, which is bound to grow further in the future. Thanks to its ability to anticipate and react, as well as deploy significant human and material resources, the Ministry of Defence is and remains deeply committed to fighting against terrorism." (*Forward by Michele Alliot-Marie, French Minister of Defence*)

CB-034093
ISBN: 2-11-095510-4
Ministry of Defence
Paris, France

MRICD Grant *cont.*

i.e., those poisons that act by inhibiting the enzyme critical for nervous transmission, acetylcholinesterase (AChE). These efforts will be informed by research into the basic physiochemical processes that define catalytic activity using techniques, such as computational chemistry, protein structural analysis by NMR and X-ray crystallography, and fast flow kinetics. Those efforts, coupled with the evaluation of catalytic efficiency, in vitro and, ultimately, *in vivo*, of the mutated proteins, will provide the basis for optimization of the requisite catalytic activity.

The center will focus not only on the design of a protein with high catalytic efficiency for the detoxification of nerve agents *in vivo*, but will also address the equally challenging problem of expression of such a protein in high yields at a potentially economically viable cost. To that end, two unique approaches will be utilized to express human proteins in plant systems. Plants offer several advantages as sources of human proteins, not the least of which is the scalability of these systems. In addition, one of their major advantages is that they are higher eukaryotic organisms that possess an endomembrane system and secretory pathway that is very similar to that of mammalian cells. As a result, complex proteins are generally efficiently assembled with the appropriate post-translations modifications.

The center has unique facilities for testing the resultant rationally designed or gene-shuffled, transiently expressed enzymes with respect to their ability to catalyze the hydrolysis of the actual threat nerve agents. Likewise, these same facilities at the USAMRICD will be used to test the products from the high expression plant systems. This unique capability will allow for immediate evaluation of proteins to allow for a rank-ordering based on in vitro results prior to further testing *in vivo*, resulting in a significant conservation of animal resources. It will also provide rapid feed-back to both the emerging computational chemistry data base and to the rational design efforts for improved activity. Finally the center will be able to perform *in vivo* evaluation of the efficacy of candidate proteins, thereby ensuring that the most promising candidates are selected for advanced development. This will save time and money, both critical commodities in drug development programs.

COL Brian Lukey, Commander of USAMRICD congratulates Dr. David Lenz on the award of the five year Center of Excellence grant from the National Institutes of Health.

"The work of this new center will lead to a paradigm shift in how to treat nerve agent exposure and will lead to therapeutics with less toxic potential and reduced immunogenicity," says Dr. Lenz. Colonel Brian Lukey, commander of the USAMRICD, says, "We are delighted that the NIH has recognized the considerable talents resident at the USAMRICD, as well as the quality of the research team organized by Dr. Lenz to address this important problem".

History of Detectors *cont.*

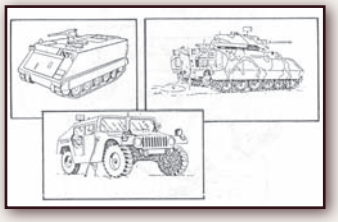
Warning Systems

XM207 Chemical Attack Warning Transmission System (CAWTS)

Although automatic chemical agent detectors included an alarm, there were still problems alerting troops spread out over an area. The XM207 CAWTS was an unsuccessful attempt to provide an alarm that would alert a platoon size unit to the presence of chemical agents. The CAWTS was a small pyrotechnic whistle and three pyrotechnic flares contained in a standard ground signal rocket. It was fired by hitting a cap containing a firing pin against a percussion primer. Once the rocket was ignited, it would shoot up to about 150 meters and release the whistle and the three flares (2 white, 1 red). The XM207 failed to meet expectations, however, and development work was stopped in 1983.[6]

NBC Reconnaissance

XM87 NBC Reconnaissance System (NBCRS)



The XM87 NBCRS was intended as a fully integrated NBC detection, warning, and communication system mounted in either an M113 Armored Personnel Carrier, an M3 Bradley Fighting Vehicle, or the High Mobility Multipurpose Wheeled Vehicle. The XM87 could detect, identify, and mark areas of NBC contamination and collect samples of contaminated materials. It could also transmit NBC contamination information and mark safe passage for other units. The Army prepared prototypes of the XM87 in the M113 carrier for testing, but in 1988, the Army decided to buy the German FUCHS armored vehicle instead of using the M113. The XM87 program was then terminated.[7]

THE 1990's

Chemical Agent Detectors

M21 Remote Sensing Chemical Agent Alarm (RSCAAL)

The concept of a remote sensing chemical agent alarm started in the 1950s, but research on the project continued throughout the 1970s and 1980s. Finally in 1992, the Army type classified the XM21 Remote Sensing Chemical Agent Alarm for low rate production. After additional work, the M21 Remote Sensing Chemical Agent Alarm was standardized in 1995. The M21 was an automatic scanning, passive infrared sensor which detected

nerve and blister agent vapor clouds based on changes in the background's infrared spectra caused by the presence of agent vapor. The detector could "see" agent clouds out to five kilometers. The M21 was mounted on a tripod or on the M93A1 NBC Reconnaissance Vehicle, although in the latter configuration, the vehicle had to stop for the unit to function correctly. Initial production was scheduled for 156 units. Fielding of the M21 Alarm began in 1995. First deployment to the frontlines occurred when six M21 Alarms were deployed to Kuwait in 1996.[8]

Improved Chemical Agent Monitor (ICAM)

Starting in 1989, the Army began a program to improve the Chemical Agent Monitor (CAM) by replacing the electronics board. The Improved Chemical Agent Monitor (ICAM) was standardized in 1993 and improved reliability, reduced maintenance costs, and eliminated the need for depot repair.[9]

M22 Automatic Chemical Agent Alarm (ACADA)

The M22 ACADA program started in the 1970s as a replacement for the M8 Alarm. After continuous development, the final version was type classified standard in 1997. The M22 was an "off-the-shelf" design that was man-portable, operated independently after system start-up, and provided an audible and visual alarm. It was an advanced point-sampling, chemical agent alarm system that augmented the CAM as a survey instrument. The unit simultaneously detected both nerve and blister agent vapor and was suitable for monitoring collective protective shelters. It was significantly more sensitive than the M8A1 Alarm and less responsive to interferences. The M22 system also provided communications interface for automatic battlefield warning and reporting. The M22 system consisted of the M88 Detector, the M42 Remote Alarm Unit, and a power supply. It can be mounted on most military vehicles. The M22 is currently being fielded to units around the world. In addition, the U.S. State Department purchased several M22 alarms for their chemical-biological response personnel.[10]

Continued pg. 20

MRICD Hosts *cont.*

Kenneth Leiter is junior chemistry/computer science major at Duke University. He, too, spent two summers as a GW apprentice at MRICD.

"My learning experiences as a GW at MRICD have shaped my learning experiences in college," Leiter said, who called the 8-week apprenticeship an intellectual journey.

"Today is what this intellectual journey is about," he said, "demonstrating to others and to yourself all that you have learned."

For the next two hours, across MRICD's campus in various meeting and conference rooms, this year's apprentices were given that opportunity. Their projects covered a broad range of activities in a variety of scientific disciplines to include molecular biology, biochemistry, behavioral sciences, toxicology, and chemistry. They worked on method and software development, as well as test and evaluation of equipment and materials.

Stanley Strawbridge, a junior this fall at John Carroll High School, was interested in bench chemistry, according to his MRICD mentor Dr. Benedict Capacio. For his project, Strawbridge was involved in developing methods to extract metabolites of chemical warfare agents from synthetic urine, as a possible means of detecting exposure to specific agents.

"He was bright, energetic, and extremely motivated," said Capacio of Strawbridge.

Colleen Roxas, who will be a junior at Aberdeen High School, turned her interest in art into a GW experience different from many of her fellow participants. Roxas worked with MRICD's graphics department, which designs for the research staff, among other things, scientific posters of their data for presentation at national and international professional meetings. Roxas learned about the process of design and how art and technology can be combined to communicate information.

"I learned a lot about graphic design," said Roxas of her summer project. "I especially liked learning the computer design software." According to Roxas, her summer project definitely introduced her to possible future careers in which she could apply her interest and talent in art.

The experience can be just as rewarding for the mentors. Many scientist volunteer as mentors as a way to give back, a way to build the scientists and engineers of the future, and, indeed, many have seen their former apprentices go on to pursue careers in science and medicine. For Cerasoli, the reasons for mentoring were simple.

"I like bringing students into my lab. They bring new life, new ideas, and new jargon to the lab," said Cerasoli. "Makes the summer go by more quickly."

Commitment to Safety *cont.*

equipment and check the lab operating procedures, which show you what you will need to perform each task. You are trained to take the proper precautions before proceeding and always work safely."

The training provided by CDTF personnel continues to highlight the importance of workforce safety in disposing of the nation's chemical weapons stockpiles. Training at the CDTF contributed to the elimination of the stockpiles at two of the nine disposal facilities. CMA demilitarization personnel eliminated the stockpile at the Johnston Island Atoll Chemical Agent Disposal System located on Johnston Island in 2000 using incineration.

Personnel used a neutralization process to destroy the stockpile at the Aberdeen Chemical Agent Disposal Facility in early 2006.

According to Christine Davis, CDTF laboratory instructor, the labs at the facility have played an integral part in the success at the chemical demilitarization sites.

Craig Seger, CDTF project manager, has worked at the facility since its inception in 1989. Seger attributed the 15-year perfect safety record to the everyday vigilance of the CDTF personnel.

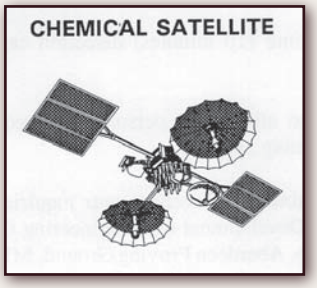
"A manager can stress the importance of safety, but it is really the job of the trained personnel and students to ingrain safety in their day-to-day activities and make it part of the culture here at the facility," Seger said.

History of Detectors *cont.*

M34A1 CBR Agent Sampling Kit

The need to make improvements to the M34 Sampling Kit became apparent during the 1980s. Of particular concern were the presence of glass vials as a component of the kit and outdated soil sampling techniques. The results was the M34A1 Kit adopted by the Army in 1999. The changes included eliminating items that gave the kit a shelf-life, removing breakable items, adding additional sampling components for soil, liquid, and surface samples, and adding M8 Detector Paper.[11]

Chemical Agent Detection Satellite



Work on an on-the-move standoff chemical agent detection system for both ground and aerial platforms in 1990 led to the concept of a satellite-based detection system. A study group concluded that the concept was feasible for both low orbit (300 kilometers) and geosynchronous platforms. The concept was to provide a near real-time (10 minutes) detection capability with a capability to alert all combat personnel using existing warning systems. The concept was pursued, but did not reach completion.[12]

Biological Agent Detectors

M31 Automatic Biological Agent Integrated Detection System Alarm (BIDS)

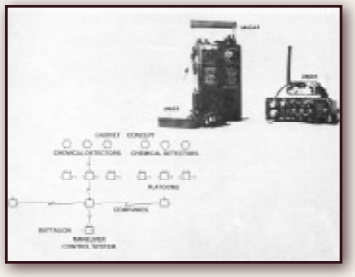
After the Gulf War, General Colin Powell testified to Congress that the U.S. was vulnerable to biological warfare. One reason was that the U.S. had been unable to standardize a good biological agent detector. In 1995, the XM31 Automatic Biological Agent Alarm (BIDS) was type classified limited procurement as the first biological alarm. The M31 was standardized in 1996. The BIDS was a small truck packed with sampling and detection equipment. Each vehicle could provide 24-hour monitoring with identification of the agent following an alarm in about 30 minutes. The BIDS was fielded to the first military unit whose sole mission was to detect the use of biological weapons. The first BIDS unit was the Army Reserve's 310th Chemical Company, created at Fort McClellan, AL in October 1996. Other units are currently receiving the BIDS.[13]

M94 Long Range Biological Standoff Detection System (LR-BSDS)

For long range detection, the Army standardized the M94 LR-BSDS in 1996. The system was intended for use on airplanes and helicopters and provided early warning, tracking, and mapping of aerosol agents. The system had the potential to detect aerosol clouds out to ranges of 100 kilometers. Early testing in 1994 demonstrated that the LR-BSDS, mounted on at UH-60 Blackhawk helicopter, could detect a biological simulant at 15-20 kilometers.[14]

Warning Systems

Chemical Agent Detector Network (CADNET)



The CADNET was a radio frequency based system designed to provide automated alert of chemical and biological detector alarms to adjacent units and higher headquarters. The system consisted of two primary components, the XM23 Detector/Transmitter Interface and the XM24 Receiver/Radio Interface. Problems with communications compatibility eventually led to the termination of the program in 1992.[15]

The Joint Warning and Reporting Network (JWARN)

The JWARN is a combination of systems linking NBC detectors to tactical communications and provides NBC warning, reporting, and battlefield management. The purpose of JWARN is to standardize NBC warning and reporting throughout the Joint Services. The current configuration includes the XM33 Detector Interface Device (Transceiver) JWARN Alarm Monitor Group. The JWARN is currently being fielded to units in the United States.[16]

Multipurpose Integrated Chemical Agent Alarm (MICAD)

The MICAD is an integrated NBC detection, warning, and reporting system designed for area warning, combat and armored vehicles as well as

Continued pg. 21

History of Detectors *cont.*

tactical van and shelter systems. The purpose of the MICAD is to automate the NBC warning and reporting process throughout the battlefield. Current configurations include: the M27 NBCRS Fox Alarm Monitor Group (MICAD) and the XM32 Tactical Vehicles/ Area Warning Alarm Monitor Group.[17]

NBC Reconnaissance Systems

M93 NBC Reconnaissance System (FOX)

The initial work with the XM87 NBC Reconnaissance System led to interest in the German FUCHS NBC Reconnaissance System that utilized the TPz-1 Spurpanzer, a six-wheeled armored vehicle. During Operation Desert Shield in 1990, the Army issued the first XM93 series NBC Reconnaissance Systems (Fox)(NBCRS), type classified urgent, limited production (LPU). The XM93 Fox was a dedicated system of NBC detection, warning, and sampling equipment integrated into a high speed, high mobility armored carrier. The onboard detection devices included the MM-1 Mobile Mass Spectrometer, the M43A1 Chemical Agent Detector, the M256 Chemical Agent Detector Kit, the AN/VDR2 Radiation Detector, and ASG1 Radiation Detector. No biological agent detector was included, although the Fox provided biological agent protection for the crew. The Fox was capable of performing NBC reconnaissance on primary, secondary, or cross-country routes throughout the battlefield and had the capability to find and mark CB contamination. While conducting the reconnaissance, the four-man crew was protected by the inclusion of an on-board overpressure system. The initial production was 48 vehicles with an additional 65 vehicles rushed into the field during Operation Desert Shield. The use of the XM93 Fox in Operation Desert Storm quickly proved its value. In 1998, the limited production version was reclassified standard although all but 24 of the early Fox vehicles were converted to M93A1 versions.

M93A1 NBC Reconnaissance System (FOX)

The M93A1 version was standardized in 1996. The M93A1 Fox was an improvement over the earlier limited production version. The addition of an M21 Remote Sensing Chemical Agent Alarm gave it the capability to detect chemical contamination at a distance. A later addition will be the CB Mass Spectrometer that will provide both chemical and biological agent detection. Once chemical agents were detected, the Fox could automatically integrate contamination information from sensors with input from on-board navigation and meteorological systems and rapidly transmit the alert to the Maneuver Control System. The M93A1 also reduced the crew size from four to three soldiers. The first deployment of the upgraded Fox vehicles with the M21 Alarm was to Bosnia in 1995.[18]

THE FUTURE *(in 2000)*

Chemical Agent Detectors

Joint Chemical Agent Detector (JCAD)

The JCAD will be a combined portable monitoring and small point chemical agent detector for aircraft, shipboard, and individual soldier applications. This hand-held, pocket-sized detector is required to automatically detect, identify, and quantify chemical agents inside the aircraft or ship, providing protection for the individual soldier, sailor, airman, or marine. For the duration of the mission, the device must be sufficiently sensitive to warn aircrews before accumulation of a dose that will cause miosis or more severe effects. It must be resistant to the severe interferent environment on a naval vessel and be small and rugged for individual use.

Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD)

The JSLSCAD will be a state-of-the-art detection system designed to provide U.S. Forces with enhanced capability in detecting chemical warfare agents. It is a lightweight, passive and fully automatic detection system that scans the surrounding atmosphere for chemical warfare agent vapors. It furnishes on-the-move, 360-degree coverage from a variety of tactical and reconnaissance platforms at distances up to 5 kilometers. It is a second-generation system that significantly improves on the capabilities of the currently-fielded M21 Remote Sensing Chemical Agent Alarm. The JSLSCAD will provide war fighters with enhanced early warning to avoid chemically-contaminated battle spaces. When avoidance is not possible, the JSLSCAD will give personnel extra time to don Mission Oriented Protective Posture gear.[19]

Continued pg. 22

History of Detectors *cont.*

Biological Agent Detectors

Short Range Biological Standoff Detection System (SR-BSDS)

The concept of the SR-BSDS is to provide a first time biological standoff detection capability to provide early warning, activate existing warning systems, and alert other biological detectors. The system will employ ultraviolet laser and laser-induced fluorescence to detect biological aerosol clouds at a standoff distance up to five kilometers. The concept called for both fixed-site applications or mobile (vehicle and aircraft) applications. The SR-BSDS is currently undergoing testing.[20]

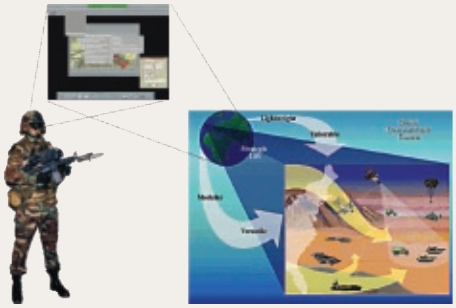
NBC Reconnaissance Systems

Joint Service Lightweight NBC Reconnaissance System (JSLNBCRS)

The JSLNBCRS will provide point and standoff intelligence for real-time field assessment of NBC hazards. The system is a vehicle-mounted suite of equipment and software designed to detect, collect, analyze, mark, and disseminate NBC data. Two variants, the High Mobility Multipurpose Wheeled Vehicle and the Light Armored Vehicle, will house the same equipment and offer on-the- move, standoff capability, while providing an air-transportable system. Timely provision of automated, digital information meshed with meteorological and positioning information will provide commanders more options in merging NBC information with tactical, operational, and strategic plans.

Fully Integrated NBC Protection

The Soldier of the Future



The soldier of the future will have fully integrated NBC protection, sensors and information. Very lightweight, embedded sensors on the soldier will provide common, high fidelity NBC situational awareness. The objective is to make the sensors transparent to the warfighter, but the resulting information apparent.[21]

Next issue—CB Detection in 2007!

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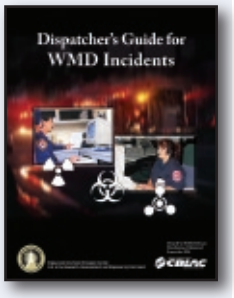
CBIAC Featured Products

Technical Report on the Portable Airlock for Non-Procedural Entry or Exit of CSEPP Pressurized Shelters
Approved for Public Release; Distribution Unlimited
CR-05-15 $10.00 July 2005

This critical review investigates the requirements, design, and fabrication of a portable airlock system for use in pressurized shelters. Since 1988, the Federal Emergency Management Agency (FEMA) and the United States (U.S.) Army have assisted communities surrounding the eight chemical stockpile sites to enhance their abilities to respond to the unlikely event of a chemical agent emergency. The Chemical Stockpile Emergency Preparedness Program (CSEPP) provides support in numerous technical areas, including the implementation of pressurized shelters or safe rooms within buildings to ensure the safety of people during chemical agent emergencies. These pressurized shelters, except for those in hospitals, have been designed without airlocks and are intended to protect those who routinely occupy the buildings. It is not intended for people to enter and exit after the shelters are closed and pressurized or to allow anyone to enter or leave during a chemical agent emergency. The development of a portable airlock system has been investigated by CSEPP to be used for non-procedural entry and exit at school shelters (e.g., the late arrival or early departure of people entering/exiting the protective shelter). This report includes photos and illustrations of design components and fabrication sequences. CB-032581.

Biological Incident Operations: A Guide for Law Enforcement
Approved for Public Release; Distribution Unlimited
CR-05-13 $25.00 September 2004



This publication was developed by the Edgewood Chemical and Biological Center to assist law enforcement agencies in managing a biological terrorism incident. The Guide includes an Introduction and Biological Incident Overview, along with sections on Biological Terrorism Awareness, Incident Information/Intelligence, Personal Protection Measures, Proposed Response to a Credible Threat and to a Suspect Material/Package/Device, Incident Investigation, Tactical Entry of a Suspected Site, Incident Control, Community Outreach, Organization of Law Enforcement Assets, References and supporting appendices. This 94 page guide is in an 8.5" by 11" format, and is spiral bound, side-tabbed, and printed on durable materials. An electronic version is available for download at http://www.edgewood.army.mil/hld/dl/ecbc_le_bio_guide.pdf.
CB-031628

Dispatcher's Guide for WMD Incidents
Approved for Public Release; Distribution Unlimited
CR-05-14 $10.00 September 2004

This publication was developed by the Edgewood Chemical and Biological Center to assist emergency response agencies in responding to a WMD incident. The Guide contains tabbed sections on general emergencies, chemical incidents, biological incidents, radiological incidents, and high yield explosive incidents, along with references and acronyms.
An electronic version is available for download at http://www.edgewood.army.mil/hld/dl/ECBC_ACWA_WMD_DISPATCH.pdf.
CB-030598

Weapons of Mass Destruction Handbook – Terms and Operational Overview
Approved for Public Release; Distribution Unlimited
SOAR-06-15 $10.00 July 2005

This publication is an unclassified reference designed to aid senior executives involved in the management of domestic or international incidents involving the use of weapons of mass destruction. In addition to classic WMD materials, this handbook also provides basic reference terms and definitions for high-yield explosive and cyber threats. It includes sections on policy, homeland security presidential directives, meteorology, biological threats, agricultural bioterrorism, chemical threats, radiation and nuclear threats, explosive threats, and cyber threats. CB-TBD

Proceedings of the 2nd DoD Sustainable Ranges Initiative Conference and Exhibition
U.S. Government Agencies and their Contractors Only; Unclassified
SOAR-06-16 $10.00 September 2005

The DoD Sustainable Ranges Initiative IPT sponsored the 2nd DoD Sustainable Ranges Initiative Conference & Exhibition to provide a venue for the exchange of information and ideas that will benefit all stakeholders involved in the military range domain. The conference was held at the Henry B. Gonzalez Convention Center in San Antonio, Texas, 22-25 August 2005. The technical program was comprised of OSD and service-oriented discussion panels, issue-specific presentation/discussion panels and over 150 individual platform and poster presentations selected from abstracts submitted for review. The CD contains the complete proceedings of this conference. The exhibition featured 63 organizations representing government and industry. CB-TBD

Explosive Simulant Kit
Federal, State, and Local Government Agencies Only – Further Distribution Only as Authorized by TSWG; Unclassified
SIMKIT-06-02 $810.00 March 2006

The Explosive Simulant Kit is a hands-on tool containing representative simulants of common commercial and improvised explosive materials as well as common initiators. These simulants consist of both visual simulants (look) and tactile simulants (feel). These simulants are not explosives and are not designed for use with detectors. There is no chemical similarity to explosives other than look and feel. The kit can be used by trainers, airport security, border security, law enforcement and other interagency users. Each kit includes a user manual that describes the simulated explosives and the precursors required to make these explosives. The kit is completely transportable via air or ground – the simulants are made from inert samples or components that are not regulated by the EPA, DOT, IATA or ICAO. The kit contains simulants for improvised explosives, commercial explosives, fuels mixed with explosives, and initiators. CB-TBD

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